Discussion

Computed tomography of the orbit was first described in 1974. Since then it has been used extensively to visualize intraorbital trauma, tumors and bacterial infection.[4-8] Descriptions of the findings in patients with intraorbital *Mucor*, however, are limited.[9-12] Most reports are restricted to single cases. In two of these single-patient case reports, the CT scan showed evidence of proptosis and medial rectus thickening,[9,10] and one patient was reported to have thickening and displacement of the medial rectus, increased density of the orbital fat and venous engorgement.[11] In all of these individual case reports, there was evidence of extensive sinus opacification on the CT scan.

The only series of cases has been compiled by Centano and co-workers, who reported the cranial CT scan findings of ten patients with rhinocerebral *Mucor*.[12] Extraorbital findings of proptosis (present in half the cases) and sinus mucosal abnormalities (present in seven patients) were common. Pleuridirectional tomography was more sensitive in detecting bony involvement of the sinuses (three patients) than CT scan (one patient). Extensive intraorbital abnormalities were not commonly seen by CT scan; four patients had no intraorbital abnormalities and three had only lateral displacement of the medial rectus. Only three of the patients had an increased density of the orbital apex consistent with an inflammatory mass.

In the scan of our patient (Figure 1), there was mild opacification of the ethmoids and thickening of the medial rectus muscle. Both the optic nerve and orbital apex were normal, however, and there was no bone involvement. The medial rectus thickening was similar to the previously described cases and apparently is a consistent finding. This muscular thickening may represent the earliest finding in orbital *Mucor*. It is a nonspecific sign, however, and the most common CT finding in cases of orbital pseudotumor.

We conclude from both our experience with this patient and from reviewing the English language literature that CT scan findings in orbital *Mucor* may be surprisingly minimal in the presence of advanced disease. Anticipated findings of a retroorbital mass with displacement of retroorbital structures and findings suggestive of massive tissue destruction are not necessarily typical CT findings and their absence should not delay an aggressive pursuit of the diagnosis of orbital *Mucor*.

Addendum

Two additional CT scan findings in cases of orbital *Mucor* have been reported: Kilpatrick and co-workers have described nonenhancement of the superior ophthalmic artery and vein,[13] and Anderson and colleagues have reported widening of the pterygomaxillary fissure.[14]

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Tuberculous Peritonitis Developing in a Case of Documented Peritoneal Carcinomatosis

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TUBERCULOUS PERITONITIS is an uncommon disease, particularly in the United States.[1] However, the rarity of this condition does not diminish the necessity of correctly making the diagnosis as therapy can be curative, whereas the disease left untreated is frequently fatal.[1-4] In this report, the case of a patient with histologically documented peritoneal spread of gastric carcinoma in whom tuberculous peritonitis developed is presented to emphasize the difficulty and importance of making this diagnosis in the presence of intra-abdominal malignancy.

Report of a Case

A 32-year-old Japanese woman presented to the UCSD (University of California, San Diego) Cancer Center for consideration of experimental intraperitoneal chemotherapy for gastric carcinoma. One year earlier she had had a subtotal gastrectomy for adenocarcinoma of the stomach. Four months before being seen at our institution, an umbilical mass was noted that on biopsy proved to be adenocarcinoma. Three months later an abdominal wall mass was detected. The patient had an exploratory laparotomy, which showed numerous peritoneal implants on the serosal surface of the small and large bowel and on the surface of the liver. A biopsy specimen (reviewed by several pathologists) confirmed the presence of recurrent tumor. A Tenckhoff catheter was placed and a regimen of experimental intraperitoneal chemotherapy of cisplatin, cytarabine and doxorubicin hydrochloride was begun.[5] Corticosteroids were included in the antiemetic regimen used. Ascites was noted on an ultrasound examination done to assist in catheter placement. At the time of initiating therapy, a left upper lobe pulmonary nodule not seen on previous chest x-ray

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ABBREVIATIONS USED IN TEXT
BCG = bacille Calmette Guérin
CT = computed tomographic
PPD = purified protein derivative

films was noted and, because the physicians caring for the patient initially suspected the nodule to represent metastatic gastric cancer, no further diagnostic evaluation was undertaken to rule out other causes of the lesion. Specifically, sputum specimens for culture were not obtained and a skin test for tuberculosis was not applied. The chest x-ray film also showed biapical scarring consistent with old granulomatous disease. The patient's maximal temperature in hospital was less than 38°C and she said she did not have respiratory tract symptoms. Peritoneal fluid cell counts, protein values and cytologic findings are shown in Table 1.

A month later the solitary pulmonary nodule had enlarged substantially. The patient remained afebrile but had lost weight and had increased ascites. A specimen of a transbronchial biopsy done to document the presence of metastatic disease showed only chronic inflammatory cells. Washings were negative for mycobacteria on acid-fast bacillus stain. Cultures of specimens obtained at the time of bronchoscopy eventually showed no growth of *Mycobacterium tuberculosis*. A purified protein derivative (PPD) skin test was done that was positive despite the fact that the patient was intermittently receiving steroids as antiemetic agents. A second course of intraperitoneal chemotherapy was administered.

Three months after presenting to our institution, the patient remained afebrile but her appetite was poor and her weight had fallen 10 kg (22 lb). An abdominal computed tomographic (CT) scan showed a pronounced increase in ascites compared with an earlier study, with probable peritoneal implants on the bowel and peritoneum. A percutaneous lung biopsy specimen again showed only inflammatory cells. However, specimens of both the biopsy material and the peritoneal fluid grew *M tuberculosis*. Unfortunately, before an antituberculous regimen was started, a small bowel obstruction developed. She underwent a bypass procedure to relieve the obstruction when conservative measures failed. At the operation the bowel was completely matted together by extensive adhesions. A biopsy specimen of material believed to represent tumor showed extensive necrotizing granulomatous inflammation without evidence of tumor. Postoperatively the patient was placed on a regimen of triple-drug antituberculous therapy. Following a slow postoperative recovery, she was able to eat normally and recovered her lost weight. She continues to receive antituberculous therapy and, except for intermittent abdominal pain most probably due to extensive adhesions, the patient remains clinically stable and without evidence of recurrent cancer 18 months following documentation of widespread peritoneal carcinomatosis.

TABLE 1.—*Peritoneal Fluid Analysis*

Date	Total Leukocyte Count/μl	Differential Count (%) Segmented Forms	Lympho-cytes	Mono-cytes	Protein Grams/dl	Cytol-ogy
Presentation . .	9,800	30	56	14	5.9	Neg
1 mo*	685	3	56	41	. . .	Neg
3 mo	150	1	93	6	6.0	Neg

Neg = No malignant cells seen

*Months following presentation to the UCSD Medical Center, San Diego.

Discussion

Tuberculosis developing in association with neoplastic disease is a well-recognized clinical problem. In a series of patients from a large cancer hospital, 9 of 1,646 patients with adenocarcinoma of the stomach seen between 1950 and 1981 were found to have tuberculosis at some time during the course of their disease—an incidence of 55/10,000 patients at risk.[6] In none of these patients was tuberculous peritonitis stated to have developed and the difficulty of diagnosing tuberculosis in this clinical setting was not commented upon.

Our patient had several predisposing factors to the development of active tuberculosis. First, she was born in Japan and had only recently moved to the United States. The incidence of tuberculosis is presently ten times higher in Japan than in the United States.[7] Second, the patient had had a subtotal gastrectomy for gastric cancer. This procedure increases the risk for the subsequent development of tuberculosis, most probably due to malnutrition.[6,8] Third, the patient was treated with chemotherapeutic agents and steroids, which are immunosuppressive. Steroids, in particular, have been implicated in the high rate of tuberculosis associated with lymphoreticular malignancy.[6,9]

The signs and symptoms of tuberculous peritonitis and peritoneal carcinomatosis are almost identical.[10] Both are associated with exudative ascites, weight loss, pain and abdominal masses.[1-4,11-17] While fever is more likely to be associated with infection, in cases of tuberculous peritonitis fever may be absent[1,3,4,11,15-17] and it is common for cancer patients (particularly those with liver metastasis) to have low-grade fevers. The finding of predominantly mononuclear cells in the ascitic fluid (Table 1) should suggest the possibility of tuberculous infection even if cultures are negative.[1,2,11,17] One report suggests a significantly higher rate of culture positivity if at least 1 liter of ascites fluid is cultured rather than the small volume (less than 100 ml) normally obtained during a diagnostic paracentesis.[2]

While the finding of a positive PPD skin test in a patient such as the one in this report should raise a strong suspicion for the presence of *M tuberculosis*, a major portion of the population of Japan has been exposed to this agent, and a positive PPD cannot be equated with the presence of active disease.[7] Also, in an immunocompromised host, a negative PPD skin test does not exclude the presence of tuberculosis as the patient may be anergic. Therefore, several skin tests should be applied when evaluating immunocompromised patients (steroid therapy or cancer) for the presence of tuberculosis.

Recently, it has been suggested that the CT scan may be helpful in the differential diagnosis of tuberculous peritonitis,[18] but the radiographic findings are relatively nonspecific and in our patient suggested progressive intra-abdominal tumor. The finding of an enlarging pulmonary nodule in a patient with known intra-abdominal malignancy would suggest the presence of metastatic tumor. However, cavitation of the lesion or rapid growth (as in this case) should raise the suspicion of an infectious cause.

The importance of correctly diagnosing tuberculous infection, particularly in patients with concomitant malignant le-

sions, is more than of academic interest and cannot be overemphasized. The disease, even in its advanced form, is curable with appropriate antituberculous medications, but the success of therapy improves when it is instituted early.[16] In a patient in whom tuberculosis is even considered in the differential diagnosis, it is imperative that cultures be adequately done to rule out this diagnostic possibility. Any biopsy specimens obtained in such patients (transbronchial, peritoneal, bone marrow) should be sent to a microbiology laboratory with specific instructions to culture for *M tuberculosis*.

At the time of exploratory laparotomy, a large biopsy specimen failed to show histologic evidence of tumor. While this finding could certainly represent sampling error or a dramatic response to the intraperitoneal chemotherapy, gastric cancer is only modestly sensitive to the currently available agents and complete remissions are extremely rare.[19] In addition, even in patients responding to therapy, an 18-plus month survival from the time of diagnosis of an extensive intra-abdominal metastatic tumor with no current evidence of active disease is very unusual.

Two retrospective analyses of patients with lung cancer undergoing surgical resection showed improved survival for those patients in whom a postoperative empyema developed.[20,21] It was speculated that the nonspecific immune response induced by the infection resulted in tumor cell kill and an increased survival rate. In a rat transplantable tumor model, it has been found that the intrapleural injection of bacille Calmette Guérin (BCG) vaccine can suppress tumor growth.[22] Similarly, while the benefit of intrapleural administration of BCG following curative surgical treatment of lung cancer remains controversial,[23] one group has shown a small but statistically significant improvement in survival for patients with stage I non-small cell lung cancer receiving intrapleural BCG plus isoniazid compared with a control group receiving only isoniazid.[24,25] No benefit could be shown for patients with stage II or III lung cancer in this study. It is interesting to speculate that the intensive inflammatory response elicited by the *Mycobacterium* infection shown at the operation may have resulted in significant tumor cell kill and be responsible for the patient's remarkable clinical course.

In summary, this case emphasizes the similar clinical and laboratory features of peritoneal carcinomatosis and tuberculous peritonitis. A high index of suspicion for the latter disease was finally responsible for the correct diagnosis being made and appropriate therapy being instituted. In addition, this case underscores the importance of strongly considering in the differential diagnosis of a complex case treatable diseases, especially when the alternative explanations have limited therapeutic implications.

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Granuloma Inguinale in a White Teenager—A Diagnosis Easily Forgotten, Poorly Pursued

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THE CONDITION variously known as granuloma inguinale, donovanosis or granuloma venereum is an uncommon disease process producing genital ulcerations that can be quite locally destructive and are known for their chronicity. The disease is most commonly seen in the southeastern United States. Although it is mandatory that this venereal disease be reported to the health department, many physicians are unaware of this fact, which may lead to underreporting. It is a relatively rare disease in California (Table 1). Granuloma inguinale can be easily diagnosed, although sometimes it is overlooked in differential diagnosis because of its rarity. The purpose of this report is to present a case of granuloma inguinale occurring in a white teenaged girl from California who suffered from a

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